Docket No.: 50395-028

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of

Masuhiro NATSUHARA, et al.

Serial No.: 09/339,826

Filed: June 25, 1999

For: CERAMIC BASE MATERIAL

Group Art Unit: 1755

Examiner: K. Group

APPEAL BRIEF

Commissioner for Patents
Washington, DC 20231

Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed January 23, 2001.

I. REAL PARTY IN INTEREST

The real party in interest is Sumitomo Electric Industries, Ltd.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals and interferences.

III. STATUS OF CLAIMS

Claims 1 through 3, all pending claims, stand finally rejected. It is from the final rejection of claims 1 through 3 that this Appeal is taken.

IV. STATUS OF AMENDMENTS

No Amendment has been filed subsequent to the issuance of the final Office Action dated December 12, 2000.

V. SUMMARY OF INVENTION

The present invention addresses and solves problems attendant upon conventional practices, particularly warpage or distortion after heat treating typically conducted subsequent to sintering, as in producing nitride sintered bodies (page 3 of the written description of the specification, lines 13 through 19). In approaching this problem, Appellants conducted experimentation and discovered that the **source** of the problem is the lack of uniformity in the distribution of sintering agents which aggravate distortion during heat treatment subsequent to sintering (page 3 of the written description, lines 10 through 13). Having uncovered the source of the problem of distortion during heating subsequent to sintering, i.e., the lack of uniform distribution of sintering agents, Appellants confronted the challenge of providing a uniform distribution of sintering agents to reduce the distortion caused by heat treatment after sintering (page 4 of the written description, lines 3 through 6). It is **without dispute** on this record that Appellants have provided enabling methodology to achieve the objective of providing a controlled high degree of uniform distribution of sintering agents in a ceramic base material to suppress distortion subsequent to heat treatment (page 5 of the written description, lines 4 through 11). ***In re Clinton, 527 F.2d 1226, 188 USPQ 365 (CCPA 1976).*** For example, enabling methodology is disclosed commencing at page 10, lines 1 et seq., for an embodiment employing a setter between the formed bodies when they are charged into a sintering furnace. Further embodiments include the step of burying the stacked formed bodies in a powder so that powder lies between the

neighboring surfaces of the formed bodies, as disclosed at page 11 of the written description, lines 11 et seq. Objective test data presented in Table 2 confirm that the uniform distribution of sintering agents does not automatically occur, but enabling methodology must be implemented to achieve that objective.

Having disclosed a problem, i.e., distortion upon heat treatment subsequent to sintering, having discovered the source of the problem, i.e., lack of uniformity of distribution of sintering agents, having provided enabling methodology to achieve a uniform distribution of sintering agent, and having confirmed that a uniform distribution of sintering agent does not automatically occur in conventional practices, Appellants now claim as their invention (independent claim 1) a ceramic base material containing sintering agents having a specified uniformity of sintering agents between opposing surfaces. The applied prior art is conspicuously mute as to any particular distribution of sintering agents between opposing surfaces of a ceramic base material. The applied prior art does not express any recognition of the significance of the uniformity of the sintering agents between opposing surfaces of a ceramic base material, particularly with respect to distortion upon heating subsequent to sintering.

VI. ISSUES

A. The Rejections

1. Claims 1 through 3 were finally rejected under 35 U.S.C. §102 for lack of novelty or, alternatively, under 35 U.S.C. §103 for obviousness predicated upon U.S. Patent No. 5,424,261 issued Harris et al. (Harris '261), Chiao, Yasumoto et al. Sugiura et al. and JP408157265 (J '265) each taken singly.

2. Claims 1 through 3 were finally rejected under 35 U.S.C. §102 for lack of novelty or, alternatively, under 35 U.S.C. §103 for obviousness predicated upon U.S. Patent No. 5,773,377 issued to Harris et al. (Harris '377).

B. The Issues Which Arise in this Appeal and require Resolution by the Honorable Board of Patent Appeals and Interferences (The Board) are:

1. Whether claims 1 through 3 are unpatentable under 35 U.S.C. §102 for lack of novelty or, alternatively, under 35 U.S.C. §103 for obviousness predicated upon each of Harris '261, Chiao, Yasumoto et al. Sugiura et al. and J '265; and

2. Whether claims 1 through 3 are unpatentable under 35 U.S.C. §102 for lack of novelty or, alternatively, under 35 U.S.C. §103 for obviousness predicated upon Harris '377.

VII. GROUPING OF CLAIMS

The appealed claims stand or fall together as a group.

VIII. THE ARGUMENT

In attempting to defeat the patentability of the claimed invention, the Examiner has unearthed references disclosing sintered bodies which, in the Examiner's eyes look something like that claimed, albeit the Examiner does **not** even contend that any of the applied references discloses anything with respect to the uniformity of distribution of sintering agents between opposing surfaces as claimed. The Examiner states "The references may or may not teach differences (sic, different) processes of making the product from the instant invention..." (ultimate two lines on page 2 of the December 12, 2000 final Office Action). The Examiner further turns a blind eye to the data in Table 2 demonstrating that the

uniformity of distribution of sintering agents required to avoid distortion does **not automatically occur**. The Examiner then would **assume** that the claimed invention is inherently satisfied by the applied references and would thrust the burden upon Appellants to come forward with evidence in rebuttal which, although of record, goes ignored. As to the rejection under 35 U.S.C. §103, the Examiner makes no attempt to make the factual inquiries mandated ***by Graham v. John Deere Co., 86 S.Ct. 684, 383 U.S. 1, 148 USPQ 459 (1966)***. Certainly an explanation of the obviousness of the claimed invention under 35 U.S.C. §103 with the requisite motivational element has not been presented. ***Ruiz v. A.B. Chance Co., ___F.3d___, 57 USPQ2d 1161 (Fed. Cir. 2000); Ecolochem Inc. v. Southern California Edison, Co. ___ F.3d ___, 56 USPQ2d 1065 (Fed. Cir. 2000).***

It is Appellants' position that the Examiner did not establish a prima facie basis to deny patentability to the claimed invention under 35 U.S.C. §102 or 35 U.S.C. §103. Moreover, Appellants submit that there is adequate evidence of record to undermine the Examiner's position.

Lack of Novelty Under 35 U.S.C. §102

The factual determination of lack of novelty under 35 U.S.C. §102 requires the identical disclosure in a single reference of each element of a claimed invention such that the identically claimed invention is placed into possession of one having ordinary skill in the art. ***Helifix Ltd. v. Blok-Lok, Ltd. ___ F.3d ___, 54 USPQ2d 1299 (Fed. Cir. 2000); Electro Medical Systems S.A. v. Cooper Life Sciences, Inc., 34 F.3d 1048, 32 USPQ2d 1017 (Fed. Cir. 1994).*** In imposing a rejection under 35 U.S.C. §102, it is incumbent upon the Examiner to identify wherein an applied reference identically describes the claimed invention. ***In re Rijckaert, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co., 730 F.2d 1452, 221 USPQ***

481 (Fed. Cir. 1984). That burden has not been discharged.

As previously pointed out, independent claim 1, requires a particular uniformity of distribution of sintering agents between opposing surfaces as measured by fluorescent x-ray detected strengths of elements. It is **not** apparent and the Examiner has made **no** attempt to identify wherein any of the applied references discloses any particular uniformity of distribution of elements between opposing surfaces, or even that such a parameter is functionally significant, i.e., an art-recognized result effective variable. Indeed, the Examiner appears to resort to the theory of inherency.

There Is No Inherency

In order to invoke the doctrine of inherency, the Examiner is required to identify a basis in the applied prior art upon which to predicate the determination that the allegedly inherent characteristic (uniformity of distribution of sintering agents) inherently flows from the teachings of the applied prior art and that such would have been recognized by one having ordinary skill in the art to place the claimed invention into actual possession of the public. ***Finnegan Corp. v. ITC, 180 F.3d 1354, 51 USPQ2d 1001 (Fed. Cir. 1999); In re Robertson, 169 F.3d 743, 49 USPQ2d 1949 (Fed. Cir. 1999).*** Indeed, as recently held by the Honorable Board, ...when an examiner relies on inherency, it is incumbent on the examiner to point to the "page and line" of the prior art which justifies an inherency theory . ***Ex parte Schricker, 56 USPQ2d 1725, 1723 (BPAI 2000).*** The Examiner has identified no such basis. Rather, the Examiner has presented references disclosing sintered aluminum nitride bodies. What is the basis upon which the Examiner has invoked the doctrine of inherency justifying the determination that the sintering agents are uniformly distributed from surface to surface of the aluminum nitride bodies disclosed in the references? There is no basis.

Thus, the Examiner has improperly attempted to shift the burden to Appellants to come forward with evidence before the Examiner has established a prima facie basis to deny patentability to the claimed invention. ***In re Mayne, 104 F.3d 1339, 41 USPQ2d 1451 (Fed. Cir. 1997); In re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992).***

Indeed, the Examiner's attempted justification to invoke the doctrine of inherency is set forth at page 2 of the December 12, 2000 Office Action and reads as follows:

> The sintered bodies of the references are to ceramic substrates in electronic applications not **unlike** the instant invention, therefor (sic, therefore) it would be expected the properties would be sufficient for such an application and therefor (sic, therefore) be within the scope of the instant claims.

Merely because the references disclose aluminum nitride sintered bodies for electronic applications does not, **therefore,** mean that such an aluminum nitride sintered bodies would **necessarily** exhibit the **uniformity of distribution of sintering agents set forth in independent claim 1.** Not that the Examiner has established a prima facie basis to rely upon the doctrine of inherency, but there is an abundance of evidence in the specification to undermine any such inherency.

Firstly, the Examiner's position on inherency turns a blind eye on Appellants **discovery** of the problem of heat distortion subsequent to sintering disclosed under the "Description of the Background Art" of the written description of the specification, commencing at page 1, line 9. Secondly, the evidence in Table 2 demonstrates that, notwithstanding overlapping compositions, the distribution of sintering agents impacts warpage. Thus, Table 2 constitutes unrefutted evidence undermining the Examiner's inherency determination.

The Examiner asserts that the evidence in Table 2 does not represent the applied prior art and is not commensurate in scope of the claims. The Examiner, however, misses the point. The evidence in the specification is offered to **undermine** the determination that overlapping compositions **necessarily,** i.e., inherently, satisfy the requirements of independent claim 1 for uniformity of distribution of sintering agents. On that issue there is no dispute by the Examiner. Thus, the evidence in the specification is argued to refute inherency. As to obviousness, the Examiner has made **no attempt** to establish a prima facie case of obviousness.

Indeed, the Examiner does **not** dispute that the methodology disclosed in the written description of the specification enables the manufacturer of sintered bodies having the uniform distribution of sintering agents specified in independent claim 1. The Examiner recognizes that the applied prior art does **not** disclose such methodology (ultimate two sentences of page 2 of the December 12, 2000 final Office Action). Yet, somehow, the Examiner maintains the inherency rejection. The constitutes factual and legal error.

35 U.S.C. §103

Simply put if the inherency rejection falls, it would appear that the obviousness rejection must fall, since the Examiner has made no attempt to establish a prima facie basis to deny patentability to the claimed invention under 35 U.S.C. §103. The entire rejection is predicated upon a perceived overlap of compositions which has not been shown to be an adequate basis upon which to predicate the inherency determination with respect to the uniformity of distribution of sintering agents. Indeed, any such determination is undermined by the undisputed evidence in Table 2. The Examiner has certainly

not attempted to make any factual findings as to any specific understanding or specific technological principle which would have realistically impelled one having ordinary skill in the art to modify the sintered bodies of any of the applied references, or the disclosed methodology, to arrive at the claimed invention. ***Ruiz v. A.B. Chance, Co., supra.; Ecolochem Inc. v. Southern California Edison, Co., supra.*** Indeed, it is undisputed on this record that none of the applied references discloses or even suggests that the uniformity of distribution of sintering agents is even an art-recognized result effective variable, much less disclose any methodology enabling the attention of a uniformity of distribution of sintering agents as specified in independent claim 1. ***In re Rijckaert, supra.***

The Individually Applied References

Set forth below are further arguments with respect to each of the applied references which support the arguments set forth supra., regarding lack of inherency and the absence of obviousness.

Yasumoto et al. and JP '265

The objectives of Yasumoto et al. and JP '265 are completely different from the objectives of the present invention. Yasumoto et al. seek to improve the adhesion strength between aluminum nitride ceramics and a metallized layer (column 1 - column 2). JP '265 also seeks to improve the adhesion strength as described on pages 3 and to curtail raw material cost.

On the other hand, the present invention seeks to suppress increased distortion upon heat treatment after sintering which objective is alien to these references. Certainly, neither Yasumoto et al. nor JP '265 recognize the warpage problem or suggest any method of charging the mold at the time of sintering to address that problem. It is, therefore, not apparent wherein resides the basis upon which to

conclude that the methods employed by either of these references would **necessarily** yield the claimed ceramic base material having the specified uniformity distribution of sintering agents between opposing surfaces. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.***

Chiao

Chiao is concerned with a co-fired metallizing method to form a non-sintered metallized layer on a ceramic layer comprising a sheet-form mold of ceramics of aluminum nitride. The formed layers are subsequently laminated in multi-layers, and then the ceramic layer and the metallized layer are simultaneously sintered. An objective of Chiao is to provide a multi-layer structured free from warpage or delamination between the layers. Chaio's warp reduction method, as disclosed in column 1 through column 3, resides in controlling the purity of the main components in the ceramic layer and metallized layer and their particle sizes, as well as controlling the co-fire temperature of the raw materials sub-component composition to produce liquid phase formation of the two layers and to make their sintering temperatures approximately at the same level. As a result (as shown in TABLE V) a multi-layered substrate having reduced warpage at less than 0.0030 inches/inch (3μm/mm) is obtained. As described under TABLE V, ordinarily a warpage amount of no more than 10μm/mm is obtained.

In contradistinction to the objectives of Chiao, in accordance with the present invention, warpage of the **ceramic substrate itself is reduced**. The method of reducing warpage in accordance with the present invention, as previously stressed, resides in strategically controlling charging of a mold at the time of sintering, as by selecting the appropriate type of setter and arraying method for the setter and the mold, thereby reducing the concentration difference of the sintering agent components between the two main surfaces (thickness direction) in the sintered body. This technique is clearly

different from that employed by Chiao. Accordingly, it is not apparent and the Examiner has not explained why the methodology of Chiao could somehow serve as a basis upon which to predicate the determination that the resulting article **necessarily** coincides with that claimed, particularly the recited uniformity of distribution of sintering agents between opposing surfaces.

Indeed, Chiao does not disclose nor suggest in any way a mold charging technique at the time of sintering. Chiao does not suggest any manner of addressing increased warpage caused by heat treatment after sintering. The level of warping of the ceramic substrate obtainable by the present method differs considerable from that of Chiao at no more than 0.1 μm/mm.

Appellants stress that Chiao neither discloses nor suggests a level of concentration difference of a sintering agent as in claim 1 of the present application. Indeed, the difference in methods employed in the present invention vis-à-vis Chiao necessarily leads to a different product.

Sugiura et al.

Sugiura et al. disclose a method of piling up the sheet-form molding product of aluminum ceramic to sinter (column 2, line 26 through column 3, line 31). As shown as Exhibit A hereto, aluminum nitride molding sheets are piled up through a thin layer of ceramic powder. The laminates are then piled up and arranged on the ceramic support base and sintered. However, in accordance with this process, warping of the sintered product is not resolved. As disclosed in column 4, lines 47 and 48, "the sintered rectangular pieces which were warped were collected". Thus, in order to reduce warping, the step of **warping correction**, as described in Exhibit A, hereto is necessary. In accordance with the methodology of Sugiura et al., the sintering process is accompanied by warping. As disclosed

by Sugiura et al., the sintering process is designed to prevent mutual sticking of the molding products.

In contradistinction to the methodology of Sugiura et al., in accordance with the present invention, a reduction of warping is obtained by the sintering process only. In the methodology of Sugiura et al., a simple powder layer is interposed between the molding products, and a solidified product is not used as in the present invention. In Sugiura et al., there is no disclosure of the level of concentration difference of the sintering agent as set forth in claim 1.

Indeed, in view of the dramatic difference in the manufacturing techniques between the present invention and the methodology of Sugiura et al., the resulting products would necessarily be different, not identical as **assumed** by the Examiner. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.*** Indeed, it would appear that the product resulting from the methodology of Sugiura et al. exhibits a greater concentration difference of sintering agents in a thickness direction than the present invention, even upon subsequent treatment at a lower temperature than that at the sintering temperature, since the concentration difference would not be reduced. The Examiner has not identified any basis upon which to predicate the determination that the product resulting from the methodology of Sugiura et al. would **necessarily** exhibit the uniformity of distribution of sintering agents between opposing surfaces as specified in the claimed invention. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.***

Harris '261

The invention disclosed by Harris '261 employs a CaO-Al_2O_3-B_2O_3 based glass pulverized product (CAB glass) and a rare earth element oxide as sintering agents seeking to provide an aluminum nitride substrate that allows small deformation such as warping together with cost reduction by low

temperature sintering. In order to attain reduced warping, it is necessary to add the above specific glass composition as a sintering agent to AlN, to sinter at a low temperature of 1550 to 1700°C and then apply a low load to the molding product during sintering (column 4, lines 15 through 46).

The steps taken by Harris '261 are not necessary in the present invention. Moreover, Harris '261 neither discloses nor suggests any particular method of charging the mold at the time of sintering as in the present invention. Moreover, Harris'261 does not disclose the warping level of the resulting sintering product or the concentration distribution level of the sintering agent as set forth in independent claim 1. As the methodology of Harris '261 differs from the methodology of the claimed invention, it can not logically be assumed that the resulting product would **necessarily** exhibit the uniformity of distribution of sintering agents between opposing surfaces as specified in independent claim 1. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.***

Harris '377

Applicants would stress that an object of Harris '377 is to provide aluminum nitride ceramics which can be sintered at a lower temperature (column 8, lines 13 through 24), and to provide a multi-layered metallized substrate which can be co-fired at a low temperature and which exhibits small deformation (column 8, lines 21 through 25). The methodology disclosed by Harris '377 requires a Y_2O_3-CaO-Al_2O_3 based specific glass composition sintering agent added to AlN, and the molded product is sintered at 1550 - 1800°C, after which it is heat treated at a temperature lower than the sintering temperature (claim 17). In the case of co-fired, multi-layered metallized substrates, the selection of the glass composition for low temperature sintering becomes feasible and a substrate having small deformation is obtained.

However, as disclosed in column 20 of Harris '377, Example B, warping is of the order of 1.5 mils/inch (1.5μm/mm). This level of warpage is considerable **larger** in comparison than the warpage of 0.1 μm/mm obtained in accordance with the present invention. Indeed, Harris '377 neither discloses nor suggests any particular strategic mold charging method at the time of sintering as in the present invention. Furthermore, Harris '377 makes no mention of the concentration difference of the sintering agents in the thickness direction as specified in claim 1. Rather, in view of the dramatic difference in methodology of the present invention vis-à-vis that employed by Harris '377, it can not logically be concluded that the product obtained by the methodology of Harris '377 necessarily corresponds to that specified in independent claim 1, particularly as to the uniformity of distributing of sintering agents between opposing surfaces. ***Finnegan Corp. v. ITC, supra; In re Robertson, supra.***

The Evidence of Record

Appellants again are constrained to stress that the evidence in Table 2 of the written description of the specification undermines the notion that all sintered bodies, particularly aluminum nitride sintered, regardless of the methods by which they are produced, exhibit the same uniformity of distribution of sintering agents between opposing surfaces which, as the evidence also reveals, impacts warpage subsequent to sintering. Thus, the data in Table 2 undermine the Examiner's inherency determination. As to obviousness, it is apparent the Examiner has not shown where any of the applied references express any recognition that the uniformity of distribution of sintering agents impacts warpage subsequent to sintering upon heating or provides any enabling methodology. The Examiner has certainly not established the requisite realistic motivation which would have impelled one having ordinary skill in the art to modify any of the structures of the applied references, or the disclosed

methodology, to arrive at the claimed invention. ***Ruiz v. A.B. Chance, Co., supra.; Ecolochem Inc. v. Southern California Edison, Co., supra.; In re Kotzab, 217 F.3d 1365, 55 USPQ 1313 (Fed. Cir. 2000); In re Dembiczak, 175 F.3d 994, 50 USPQ2d 1614 (Fed. Cir. 1999).***

IX. CONCLUSION

Based upon the arguments submitted supra., Appellants respectfully submit that the Examiner has not discharged the initial burden of providing a technological basis upon which to invoke the doctrine of inherency. Indeed, the evidence in Table 2 undermines the Examiner's inherency theory. The Examiner has not even attempted to establish a prima facie case of obviousness by making the requisite factual findings mandated by ***Graham v. John Deere Co., supra.*** Certainly, the Examiner has not made attempt to establish the requisite motivational element. ***Ruiz v. A.B. Chance, Co., supra.; Ecolochem Inc. v. Southern California Edison, Co., supra.; In re Kotzab, supra.; In re Dembiczak, supra.*** Moreover, in any obviousness consideration, the problems addressed and solved by the present invention, as well as the discovery of source of the problem, constitute nonobviousness indicia which can not be ignored as the Examiner has done. ***North American Vaccine, Inc. v. American Cyanamid Co., 7 F.3d 1571, 28 USPQ2d 1333 (Fed. Cir. 1993); Northern Telecom, Inc. v. Datapoint Corp., 908 F.2d 931, 15 USPQ2d 1321 (Fed. Cir. 1990); In re Sponnoble, 405 F.2d 578, 160 USPQ 237 (CCPA 1969).***

X. PRAYER FOR RELIEF

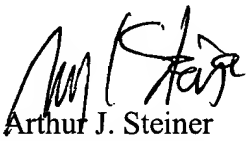
For reasons submitted supra., Appellants submit that the Examiner has not established a prima facie basis to deny patentability to the claimed invention under 35 U.S.C. §102 or 35 U.S.C. §103. Appellants, therefore, respectfully solicit the Honorable Board to reverse each of the Examiner's

rejections under 35 U.S.C. §102 or, alternatively, 35 U.S.C. §103.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

MCDERMOTT, WILL & EMERY



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APPENDIX

1. A ceramic base material comprising main constituent elements and sintering agents the sintering agents comprising constituent elements, the base material satisfying the following formula:

$a/b \leq 1.3$,

where a: the larger of c1 and c2,

b: the smaller of c1 and c2,

c1: the ratio "k" at a main-surface side,

c2: the ratio "k" at the other main-surface side,

$k = s/m$,

s: the fluorescent X-ray detected strength of the constituent elements of the sintering agents,

m: the fluorescent X-ray detected strength of the main-constituent elements.

2. The ceramic base material as defined in claim 1, wherein the ceramic consists mainly of nitride.

3. The ceramic base material as defined in claim 2, wherein the ceramic is an aluminum nitride ceramic.

EXHIBIT

"A"

Sugiura '983's warping reduction method